CIVIL AIM CONSULTANTS & ENGINEERS

(Building Geo-Tech & Highway Materials Testing Laboratory)

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NABL Accredited As Per ISO/IEC 17025:2017 Laboratory

Job No.: CACE/BBMP/SLS/W.No.14/2022-23 Date: 09.03.2023

TEST REPORT ON COMPRESSIVE STRENGTH OF CONCRETE CUBES

Client :**Assistant Executive Engineer, Dasarahalli Sub Division, BBMP, Bangalore.**

Agency :**Sri. Shivalingaiah Satish , Contractor, Bangalore.**

Name of the work :Improvements to Drains and Providing Asphalting to Roads at Havanoor Layout and Surroundings in Ward No.14 Bagalagunte

Sample ID : Cement Concrete

Size of cubes : 150mmx150mmx150mm

Cross Sectional Area : 22500 mm^2

Technical Reference : IS: 516-1959 (Reaffirmed 2008)

Grade of Concrete : M_{20}

Compressive Strength as on : 7th day

Sl.No.	Date of casting	Date of testing	Weight of cube (Kg)	Failure load (KN)	Compressive strength (N/mm^2)
1	02.03.2023	09.03.2023	8.114	340.3	15.12
2	02.03.2023	09.03.2023	8.121	355.1	15.78
3	02.03.2023	09.03.2023	8.157	346.5	15.40

Note:

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For CIVIL AIM CONSULTANTS & ENGINEERS

Authorised Signatory

Assistant Executive Engineer
T. Dasarahalli Sub Division
Bagalagunte, BBMP
Bangalore-560073

No. 01, Satvika Nilaya, Opp. Widia Poorna Prajna School,
Ramaiah Layout, Nagasandra, Bangalore - 560 073.
Ph: 9591618639, GSTIN: 29CNWPD9510K1ZB, Email: civilaimconsultants@gmail.com

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Job No.: CACE/BBMP/SLS/W.No.14/2022-23 Date: 30.03.2023

TEST REPORT ON COMPRESSIVE STRENGTH OF CONCRETE CUBES

Client :**Assistant Executive Engineer, Dasarahalli Sub Division, BBMP, Bangalore.**

Agency :**Sri. Shivalingaiah Satish , Contractor, Bangalore.**

Name of the work :Improvements to Drains and Providing Asphalting to Roads at Havanoor Layout and Surroundings in Ward No.14 Bagalagunte

Sample ID : Cement Concrete

Size of cubes : 150mmx150mmx150mm

Cross Sectional Area : 22500 mm^2

Technical Reference : IS: 516-1959 (Reaffirmed 2008)

Grade of Concrete : M_{20}

Compressive Strength as on : 28th day

Sl.No.	Date of casting	Date of testing	Weight of cube (Kg)	Failure load (KN)	Compressive strength (N/mm^2)
1	02.03.2023	30.03.2023	8.175	506.3	22.50
2	02.03.2023	30.03.2023	8.180	509.7	22.65
3	02.03.2023	30.03.2023	8.191	514.8	22.88

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T. Dasarahalli Sub Division
Bagalagunte, BBMP
Bangalore-560073

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Job No.: CACE/BBMP/SLS/W.No.14/2022-23 Date: 09.03.2023

TEST REPORT ON COMPRESSIVE STRENGTH OF CONCRETE CUBES

Client :**Assistant Executive Engineer, Dasarahalli Sub Division, BBMP, Bangalore.**

Agency :**Sri. Shivalingaiah Satish , Contractor, Bangalore.**

Name of the work :Improvements to Drains and Providing Asphalting to Roads at Havanoor Layout and Surroundings in Ward No.14 Bagalagunte

Sample ID : Cement Concrete

Size of cubes : 150mmx150mmx150mm

Cross Sectional Area : 22500 mm^2

Technical Reference : IS: 516-1959 (Reaffirmed 2008)

Grade of Concrete : M_{20}

Compressive Strength as on : 7th day

Sl.No.	Date of casting	Date of testing	Weight of cube (Kg)	Failure load (KN)	Compressive strength (N/mm^2)
1	02.03.2023	09.03.2023	8.144	342.5	15.22
2	02.03.2023	09.03.2023	8.163	344.1	15.29
3	02.03.2023	09.03.2023	8.190	345.6	15.36

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T. Dasarahalli Sub Division
Bagalagunte, BBMP

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Job No.: CACE/BBMP/SLS/W.No.14/2022-23 Date: 30.03.2023

TEST REPORT ON COMPRESSIVE STRENGTH OF CONCRETE CUBES

Client :**Assistant Executive Engineer, Dasarahalli Sub Division, BBMP, Bangalore.**

Agency :**Sri. Shivalingaiah Satish , Contractor, Bangalore.**

Name of the work :Improvements to Drains and Providing Asphalting to Roads at Havanoor Layout and Surroundings in Ward No.14 Bagalagunte

Sample ID : Cement Concrete

Size of cubes : 150mmx150mmx150mm

Cross Sectional Area : 22500 mm^2

Technical Reference : IS: 516-1959 (Reaffirmed 2008)

Grade of Concrete : M_{20}

Compressive Strength as on : 28th day

Sl.No.	Date of casting	Date of testing	Weight of cube (Kg)	Failure load (KN)	Compressive strength (N/mm^2)
1	02.03.2023	30.03.2023	8.174	505.3	22.46
2	02.03.2023	30.03.2023	8.182	511.2	22.72
3	02.03.2023	30.03.2023	8.196	514.3	22.86

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Authorised Signatory

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T. Dasarahalli Sub Division
Bagalagunte, BBMP
Bangalore-560073

No. 01, Satvika Nilaya, Opp. Widia Poorna Prajna School,
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Job No.: CACE/BBMP/SLS/W.No.14/2022-23

Date: 27.02.2023

PRECAST SLAB 100mm Thick(CORE) TEST REPORT

Client : **Assistant Executive Engineer, T.Dasarahalli Sub Division, BBMP, Bangalore.**

Contractor : **: Sri. Shivalingaiah Satish , Contractor, Bangalore.**

Name of Work : : Improvements to Drains and Providing Asphalting to Roads at Havanoor Layout and Surroundings in Ward No.14 Bagalagunte

No.of Sample Tested : 03

Date of Testing : 27.02.2023

Techinical Reference : IS:516-1959 (Reaffirmed 1999), SP-24:1983.

Grade of Concrete : M25

Sl. No.	Dia of Core D (mm)	Height of Core H (mm)	Core Wt (Kg)	Density of Core (kg / m^3)	H / D	Correction factor (Based on H/D)	Failure Load (kN)	Core Strength (N/mm^2)	Correction Factor for the Dia. (Strength of the Core x 1.08)	Corrected Cylinder Compressive Strength (N/mm^2)	Equivalent Cube Compressive Strength (N/mm^2)
1	50.00	86.00	0.381	2256.30	1.72	0.970	39.00	19.86	21.45	20.80	26.00
2	50.00	85.00	0.387	2318.79	1.70	0.968	40.00	20.37	22.00	21.29	26.61
3	50.00	84.00	0.395	2394.90	1.68	0.965	41.50	21.14	22.83	22.04	27.55

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Authorised Signatory

Assistant Executive Engineer
T. Dasarahalli Sub Division
Bagalagunte, BBMP
Bangaloro-560073

No. 01, Satvika Nilaya, Opp. Widia Poorna Prajna School,
Ramaiah Layout, Nagasandra, Bangalore - 560 073.
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Job No.: CACE/BBMP/SLS/W.No.14/2023-24

Date :26.04.2023

GRADATION FOR WMM

Client	**Assistant Executive Engineer, Dasarahalli Sub Division, BBMP, Bangalore.**
Agency	**Sri. Shivalingaiah Satish , Contractor, Bangalore.**
Name of Work	Improvements to Drains and Providing Asphalting to Roads at Havanoor Layout and Surroundings in Ward No.14 Bagalagunte
IS Code:	: IS 2386 (Part 1):1963(RA 2011)
Date of Testing	:26.04.2023
Material Type	: Wet Mix Macadam

Oven Dry.Wt, grar 10000

Is Sieve Size in mm	Weight Retained (gm)	Cumulative Weight Retained (gm)	Cumulative % of Retained	Cumulative % of Passing	Requirement as per MORTH 5th edition table no 400.13
53	0	0	0	100	100
45	163	163	1.6	98.4	95-100
22.4	2531	2694	26.9	73.1	60-80
11.2	2140	4834	48.3	51.7	40-60
4.75	1843	6677	66.8	33.2	25-40
2.36	1188	7865	78.7	21.4	15-30
0.600	580	8445	84.5	15.6	8-22
0.075	1229	9674	96.7	3.3	0-5

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For CIVIL AIM CONSULTANTS & ENGINEERS

Assistant Executive Engineer
Dasarahalli Sub Division
Bagalagunte, BBMP
560073

Authorised Signatory

No. 01, Satvika Nilaya, Opp. Widia Poorna Prajna School,
Ramaiah Layout, Nagasandra, Bangalore - 560 073.
Ph: 9591618639, GSTIN: 29CNWPD9510K1ZB, Email: civilaimconsultants@gmail.com

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Job No.: CACE/BBMP/SLS/W.No.14/2023-24 Date :26.04.2023

GRADATION FOR WMM

Client	**Assistant Executive Engineer, Dasarahalli Sub Division, BBMP, Bangalore.**
Agency	**Sri. Shivalingaiah Satish , Contractor, Bangalore.**
Name of Work	Improvements to Drains and Providing Asphalting to Roads at Havanoor Layout and Surroundings in Ward No.14 Bagalagunte
IS Code:	: IS 2386 (Part 1):1963(RA 2011)
Date of Testing	:26.04.2023
Material Type	: Wet Mix Macadam

Oven Dry.Wt, grar 10000

Is Sieve Size in mm	Weight Retained (gm)	Cumulative Weight Retained (gm)	Cumulative % of Retained	Cumulative % of Passing	Requirement as per MORTH 5th edition table no 400.13
53	0	0	0	100	100
45	189	189	1.9	98.1	95-100
22.4	2547	2736	27.4	72.6	60-80
11.2	2214	4950	49.5	50.5	40-60
4.75	1895	6845	68.5	31.6	25-40
2.36	1195	8040	80.4	19.6	15-30
0.600	584	8624	86.2	13.8	8-22
0.075	1247	9871	98.7	1.3	0-5

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T. Dasarahalli Sub Division
Bagalagunte, BBMP
Bangalore-560073

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Job No.: CACE/BBMP/SLS/W.No.14/2023-24 Date : 26.04.2023

ATTERBERG LIMITS TEST FOR WMM

Client **Assistant Executive Engineer, T.Dasarahalli Sub Division, BBMP, Bangalore.**

Agency **Sri. Shivalingaiah Satish , Contractor, Bangalore.**

Name of Work Improvements to Drains and Providing Asphalting to Roads at Havanoor Layout and Surroundings in Ward No.14 Bagalagunte

IS Code: : IS 2720(Part 5):1985

Date of Testing :24.04.2023 TO 26.04.2023

Material Type : Wet Mix Macadam

Sl. No.	Particulars	Test Results	Requirement as per MORTH 5th edition Cl.406.2.1.2
1	Liquid Limit	21.50	-
2	Plasticity Index, %	Non Plastic	6.0% Maximum.

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T. Dasarahalli Sub Division
Bagalagunte, BBMP
Bangalore-560073

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Job No.: CACE/BBMP/SLS/W.No.14/2023-24 Date : 26.04.2023

ATTERBERG LIMITS TEST FOR WMM

Client **Assistant Executive Engineer, T.Dasarahalli Sub Division, BBMP, Bangalore.**

Agency **Sri. Shivalingaiah Satish , Contractor, Bangalore.**

Name of Work Improvements to Drains and Providing Asphalting to Roads at Havanoor Layout and Surroundings in Ward No.14 Bagalagunte

IS Code: : IS 2720(Part 5):1985

Date of Testing :24.04.2023 TO 26.04.2023

Material Type : Wet Mix Macadam

Sl. No.	Particulars	Test Results	Requirement as per MORTH 5th edition Cl.406.2.1.2
1	Liquid Limit	23.00	-
2	Plasticity Index, %	Non Plastic	6.0% Maximum.

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Job No.: CACE/BBMP/SLS/W.No.14/2023-24 Date: 26.04.2023

Aggregate Impact Value

Client	**: Assistant Executive Engineer, T.Dasarahalli Sub Division, BBMP, Bangalore.**
Agency	**: Sri. Shivalingaiah Satish , Contractor, Bangalore.**
Name of the Work	: Improvements to Drains and Providing Asphalting to Roads at Havanoor Layout and Surroundings in Ward No.14 Bagalagunte
IS Code	IS 2386 (Part 4):1963(RA 2011)
Type of Mix	Wet Mix macadam
Date of Testing	26.04.2023

Sl No.	Details	Test No. 1	Test No. 2	Average
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	383	385	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	86	87.5	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	297	297.5	
4	Aggregate Impact value = percent fines 100* (W_2/W_1)%	22.45	22.73	**22.59**

Comments:

→ Maximum allowable Aggregate Impact value for Wet mix Macadam is 30%(As per MORTH Specication table 400.12)

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Job No.: CACE/BBMP/SLS/W.No.14/2023-24 Date : 26.04.2023

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Client	**Assistant Executive Engineer, Dasarahalli Sub Division, BBMP, Bangalore.**
Agency	**Sri. Shivalingaiah Satish , Contractor, Bangalore.**
Name of Work	Improvements to Drains and Providing Asphalting to Roads at Havanoor Layout and Surroundings in Ward No.14 Bagalagunte
BIS code:	IS 2386(Part 1) 1963 (RA 2011)
Type of Mix	Wet Mix Macadam
Date of Testing	26.04.2023

Sl no	Test	1	2	Requirements as per MORTH 5th edition table no 400.12
1	Flakiness Index %	11.90	12.30	Combined Flakiness & Elongation index Max 35%
2	Elongation Index %	12.60	12.90	
	Combined Flakiness & Elongation index	24.50	25.20	

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T. Dasarahalli Sub Division
Bagalagunte, BBMP
Bangalore-560073

No. 01, Satvika Nilaya, Opp. Widia Poorna Prajna School,
Ramaiah Layout, Nagasandra, Bangalore - 560 073.
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JobNo: CACE/BBMP/SLS/W.No.14/2023-24 Date : **15.05.2023**

TEST RESULTS OF AGGREGATE SHAPE TEST
(Flakiness & Elongation)

Client **Assistant Executive Engineer, T.Dasarahalli Sub Division, BBMP, Bangalore.**

Agency : **Sri. Shivalingaiah Satish , Contractor, Bangalore.**

Name of work : Improvements to Drains and Providing Asphalting to Roads at Havanoor Layout and Surroundings in Ward No.14 Bagalagunte

BIS Code : IS 2386 Part (1):1963

Date of Test : 15.05.2023

Type of Mix : Dense Graded Bituminous Macadam

Sl.No.	Flakiness Index Value(%)	Elongation Index Value(%)	Total(Combined Flakiness and Elongation)(%)	Requirements
1	12.60	13.50	26.10	Maximum allowable Combined Flakiness and Elongation Indices for Dense Graded Bituminous Macadam is 35% as per Table 500.8 MORTH Specification.
2	12.30	13.40	25.70	

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T. Dasarahalli Sub Division
Bagalagunte, BBMP
Bangalore-560073

No. 01, Satvika Nilaya, Opp. Widia Poorna Prajna School,
Ramaiah Layout, Nagasandra, Bangalore - 560 073.
Ph: 9591618639, GSTIN: 29CNWPD9510K1ZR, Email:

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Job No.: CACE/BBMP/SLS/W.No.14/2023-24 Date: 15.05.2023

Aggregate Gradation Test

Client	**Assistant Executive Engineer, T.Dasarahalli Sub Division, BBMP, Bangalore.**
Agency	**Sri. Shivalingaiah Satish , Contractor, Bangalore.**
Name of the Work	Improvements to Drains and Providing Asphalting to Roads at Havanoor Layout and Surroundings in Ward No.14 Bagalagunte
BIS Code	IS 2386(Part 1):1963(RA 2011)
Sample I / D	Hot mix Plant, Bangalore.
Type of Mix	Dense Graded Bituminous Macadam
Date of Testing	15.05.2023

Total Weight of Sample: **10000** gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Requirement as per MORTH table 500.10	Remarks
37.50	0	0.0	0	100	100	Gradation satisfies Grade II MORTH specification
26.50	505	5.1	5.05	94.95	90 - 100	
19.00	1341	13.4	18.46	81.54	71 - 95	
13.20	1377	13.8	32.23	67.77	56 - 80	
4.75	2412	24.1	56.35	43.65	38 - 54	
2.36	1154	11.5	67.89	32.11	28 - 42	
0.300	1339	13.4	81.28	18.72	7 - 21	
0.075	1201	12.0	93.29	6.71	2 - 8	

Total Weight of Sample: **10000** gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Requirement as per MORTH table 500.10	Remarks
37.5	0	0.0	0	100	100	Gradation satisfies Grade II MORTH specification
26.5	755	7.6	7.55	92.45	90 - 100	
19	1451	14.5	22.06	77.94	71 - 95	
13.2	1199	12.0	34.05	65.95	56 - 80	
4.75	2422	24.2	58.27	41.73	38 - 54	
2.360	1198	12.0	70.25	29.75	28 - 42	
0.300	1348	13.5	83.73	16.27	7 - 21	
0.075	1177	11.8	95.50	4.50	2 - 8	

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T.Dasarahalli Sub Division
Bagalagunte, BBMP

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JobNo: CACE/BBMP/SLS/W.No.14/2023-24 Date : 15.05.2023

TEST RESULTS OF AGGREGATE IMPACT VALUE

Client Assistant Executive Engineer, T.Dasarahalli Sub Division, BBMP, Bangalore.

Agency : Sri. Shivalingaiah Satish , Contractor, Bangalore.

Name of work :Improvements to Drains and Providing Asphalting to Roads at Havanoor Layout and Surroundings in Ward No.14 Bagalagunte

Source / Location : Hot Mix Plant, Bangalore

BIS Code : IS 2386 Part (4):1963

Type of Mix : Dense Graded Bituminous Macadam

Date of test : 15.05.2023

Sl No.	Details	Trial No.		Average
		1	2	
1	Total weight of aggregate sample filling the cylindrical measure = W1 g	386	381	
2	Weight of agregate passing 2.36 mm sieve after the test = W2 g	87	85	
3	Weight of aggregate retained 2.36 mm sieve after the test = W3 g	299	296	
5	Aggregate Impact value = percent fines	22.57	22.31	**22.44**
	100* (W2/W1) percent			

Comments:

→ Maximum allowable Aggregate Impact value for Dense Graded Bituminous Macadam is 27% (Table 500-8 of MORTH specification)

Note:

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For CIVIL AIM CONSULTANTS & ENGINEERS

Authorised Signatory

Assistant Executive Engineer
T. Dasarahalli Sub Division
Bagalagunte, BBMP

No. 01, Satvika Nilaya, Opp. Widia Poorna Prajna School,
Ramaiah Layout, Nagasandra, Bangalore - 560 073.
Ph: 9591618639, GSTIN: 29CNWPD9510K1ZB, Email: civilaimconsultants@gmail.com

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Job No: CACE/BBMP/SLS/W.No.14/2023-24 Date: **15.05.2023**

TEST REPORT ON PAVING BITUMEN

Client	**Assistant Executive Engineer,** T.Dasarahalli Sub Division, BBMP, Bangalore.
Agency	Sri. Shivalingaiah Satish , Contractor, Bangalore.
Name of work	Improvements to Drains and Providing Asphalting to Roads at Havanoor Layout and Surroundings in Ward No.14 Bagalagunte
BIS Code	IS 73:2013,IS 1203:1978, IS 1208:1978, IS 1205:1978, IS1448(P-69):1969
Date of Testing	**15.05.2023**
Type of Mix	**Dense Graded Bituminous Macadam , VG 30**
Source of Location	**Hot Mix Plant**

The results of the tests conducted on the bitumen sample using for Dense Graded Bituminous Macadam

Sl.No	Description	Test Result	Requirement as per IS:73:2013
1	Penetration at 25 0C, 100gms, 5sec, 1/10 mm	52	Min 45
2	Softening point, 0C	50	Min 47
3	Ductility at 250C, cm	>101	Min40
4	Flash Point, 0C	265	Min 220

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Authorised Signatory

Assistant Executive Engineer
T. Dasarahalli Sub Division
Bagalagunte, BBMP

No. 01, Satvika Nilaya, Opp. Widia Poorna Prajna School,
Ramaiah Layout, Nagasandra, Bangalore - 560 073.
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Job No.: CACE/BBMP/SLS/W.No.14/2023-24 Date: 17.05.2023

Specific Gravity And Water Absorption Test

Client	**Assistant Executive Engineer, T.Dasarahalli Sub Division, BBMP, Bangalore.**
Agency	**Sri. Shivalingaiah Satish , Contractor, Bangalore.**
Name of the Work	Improvements to Drains and Providing Asphalting to Roads at Havanoor Layout and Surroundings in Ward No.14 Bagalagunte
BIS Code	IS 2386(Part 3):1963
Type of Mix	Dense Graded Bituminous Macadam
Date of Testing	15.05.2023 to 17.05.2023

Sl. No.	Details	Notation	Test Number			Mean Value
			Test 1	Test 2	Test 3	
1	Weight of aggregate suspended in water with the basket	W_1 g	2022	2024	2026	
2	Weight of basket suspended in water	W_2 g	756	759	761	
3	Weight of saturated aggregate in water	$(W_1 - W_2) = W_s$ g	1266	1265	1265	
4	Weight of saturated surface dry aggregate in air	W_3 g	2015	2017	2018	
5	Weight of water equal to the volume of the aggregate	$(W_3 - W_S)$ g	749	752	753	
6	Weight of oven dried aggregate	W_4 g	2007	2007	2005	
7	Specific Gravity	$W_4/(W_3-W_S)$	2.680	2.669	2.663	2.670
8	Apparent Specific gravity	$W_4/(W_4-W_S)$	2.709	2.705	2.709	2.708
9	Water Absorption	$((W_3-W_4)*100)/W_4$	0.40%	0.50%	0.65%	0.52%

Comments:

→ Maximum allowable Aggregate Water absorption value for Dense Graded Bituminous Macadam is 2.0%(As per MORTH table 500.8)

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Authorised Signatory

Assistant Executive Engineer
T.Dasarahalli Sub Division
Bagalagunte, BBMP

No. 01, Satvika Nilaya, Opp. Widia Poorna Prajna School,
Ramaiah Layout, Nagasandra, Bangalore - 560 073.
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Job No.: CACE/BBMP/SLS/W.No.14/2023-24 Date: 22.05.2023

TEST REPORT ON STABILITY OF MIX

Client	:	**Assistant Executive Engineer,** T.Dasarahalli Sub Division, BBMP, Bangalore.
Agency	:	Sri. Shivalingaiah Satish , Contractor, Bangalore.
Name of the Work	:	Improvements to Drains and Providing Asphalting to Roads at Havanoor Layout and Surroundings in Ward No.14 Bagalagunte
Type of Mix	:	Dense Graded Bituminous Macadam
Date of Testing	:	22.05.2023

The results of the tests conducted on the Dense Graded Bituminous Macadam mix sample are as follows:

Sl. No	Description	Test Result 1	Test Result 2	Requirement as per MORTH (Table 500-19)
1	Marshal Stability, Kn	10.21	9.47	9 Kn (min)
2	Marshal flow, mm	3.12	2.72	2 – 4
3	Percent air voids in Mineral Aggregate	14.11	13.24	13 – 15
4	Voids in Compacted Mix	4.54	3.78	3 – 6
5	Percent Voids filled with Bitumen	70.25	67.95	65 - 75
6	Density, g/cc	2.24	2.21	--

Note:

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For CIVIL AIM CONSULTANTS & ENGINEERS

Assistant Executive Engineer
T. Dasarahalli Sub Division
Bagalagunte, BBMP
Bangalore-560073

Authorised Signatory

No. 01, Satvika Nilaya, Opp. Widia Poorna Prajna School,
Ramaiah Layout, Nagasandra, Bangalore - 560 073.
Ph: 9591618639, GSTIN: 29CNWPD9510K1ZB, Email: civilaimconsultants@gmail.com

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Job No.: CACE/BBMP/SLS/W.No.14/2023-24 Date: 22.05.2023

BITUMEN CONTENT AND GRADATION DETERMINATION OF DENSE GRADED BITUMINOUS MACADAM MIX
AASHTO T 164 & AASHTO T 30

Client	**Assistant Executive Engineer, T.Dasarahalli Sub Division, BBMP, Bangalore.**
Agency	**Sri. Shivalingaiah Satish , Contractor, Bangalore.**
Name of the Work	Improvements to Drains and Providing Asphalting to Roads at Havanoor Layout and Surroundings in Ward No.14 Bagalagunte
Date of Testing	22.05.2023

BITUMEN CONTENT DETERMINATION

Description	Test 1	Test 2
1. Weight of Mixture before Test, g	500	500
2. Weight of Mixture after Test, g	477	477
3. Weight of Asphalt and Mineral matter Extracted, g	-	-
4. Weight of Mineral Matter, g.	-	-
5. Weight of Ash, g		
6. Weight of Bitumen Extracted, g. (corrected)	23.00	23.00
7. Bitumen content in %	4.60	4.60
8. Average	4.60	

GRADATION AFTER EXTRACTION

SIEVE SIZE	Test 1				Requirement as per MORTH table 500.10
mm	Weight Retained, gm	Cummulative Weight Retained	%Cummulative Retained	% Passing	
37.5	0	0	0	100	100
26.5	36.2	36.2	7.6	92.4	90 - 100
19	77.1	113.3	23.8	76.2	71 - 95
13.2	68.5	181.8	38.1	61.9	56 - 80
4.75	92.1	273.9	57.4	42.6	38 - 54
2.360	68.7	342.6	71.8	28.2	28 - 42
0.300	90.2	432.8	90.7	9.3	7 - 21
0.075	22.2	455	95.4	4.6	2 - 8

SIEVE SIZE	Test 2				Requirement as per MORTH table 500.10
mm	Weight Retained, gm	Cummulative Weight Retained	%Cummulative Retained	% Passing	
37.5	0	0	0	100	100
26.5	40.1	40.1	8.4	91.6	90 - 100
19	72.4	112.5	23.6	76.4	71 - 95
13.2	62.2	174.7	36.6	63.4	56 - 80
4.75	78.90	253.6	53.2	46.8	38 - 54
2.360	74.7	328.3	68.8	31.2	28 - 42
0.300	96.4	424.7	89.0	11.0	7 - 21
0.075	22.7	447.4	93.8	6.2	2 - 8

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For CIVIL AIM CONSULTANTS & ENGINEERS

Authorised Signatory

Assistant Executive Engineer
T. Dasarahalli Sub Division
Bagalagunte, BBMP
Bangalore-560073

No. 01, Satvika Nilaya, Opp. Widia Poorna Prajna School,
Ramaiah Layout, Nagasandra, Bangalore - 560 073.
Ph: 9591618639, GSTIN: 29CNWPD9510K1ZB, Email: civilaimconsultants@gmail.com

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Aggregate Impact Value

Client	**Assistant Executive Engineer, T.Dasarahalli Sub Division, BBMP, Bangalore.**
Agency	**Sri. Shivalingaiah Satish , Contractor, Bangalore.**
Name of the Work	Improvements to Drains and Providing Asphalting to Roads at Havanoor Layout and Surroundings in Ward No.14 Bagalagunte
BIS Code	IS 2386(Part 4):1963
Source / Location	Hot Mix Plant, Bangalore
Type of Mix	Bituminous Concrete
Date of Testing	16.05.2023

Sl No.	Details	Test No.		Average
		1	2	
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	381	385.5	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	84.5	85.5	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	296.5	300	
4	Aggregate Impact value = percent fines 100* (W_2/W_1) percent	22.18	22.18	**22.18**

Comments:

→ Maximum allowable Aggregate Impact value for Bituminous Concrete is 24%(MORTH table no.500.16)

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Authorised Signatory

Assistant Executive Engineer
T. Dasarahalli Sub Division
Bagalagunte, BBMP
Bangalore-560073

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Job No.: CACE/BBMP/SLS/W.No.14/2023-24 Date : 16.05.2023

Aggregate Gradation Test

IS : 2386 Part I

Client	**Assistant Executive Engineer, T.Dasarahalli Sub Division, BBMP, Bangalore.**
Agency	**Sri. Shivalingaiah Satish , Contractor, Bangalore.**
Name of the Work	Improvements to Drains and Providing Asphalting to Roads at Havanoor Layout and Surroundings in Ward No.14 Bagalagunte
BIS Code	IS 2386(Part 1):1963
Sample I / D	Hot Mix Plant, Bangalore
Type of Mix	Bituminous Concrete
Date of Testing	16.05.2023

Total Weight of Sample: **5000** gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Requirement as per MORTH table 500.17	Remarks
19	0	0	0	100	100	Gradation satisfies Bituminous concrete Grade-II specification as per MORTH
13.2	456	9.12	9.12	90.88	90 - 100	
9.5	475	9.50	18.62	81.38	70 - 88	
4.75	652	13.04	31.66	68.34	53 - 71	
2.36	691	13.82	45.48	54.52	42 - 58	
1.18	541	10.82	56.30	43.70	34 - 48	
0.600	555	11.10	67.40	32.60	26 - 38	
0.300	495	9.90	77.30	22.70	18 - 28	
0.150	365	7.30	84.60	15.40	12 - 20	
0.075	501	10.02	94.62	5.38	4 - 10	

Total Weight of Sample: **5000** gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Requirement as per MORTH table 500.17	Remarks
19	0	0	0	100	100	Gradation satisfies Bituminous concrete Grade-II specification as per MORTH
13.2	431	8.62	8.62	91.38	90 - 100	
9.5	551	11.02	19.64	80.36	70 - 88	
4.75	675	13.50	33.14	66.86	53 - 71	
2.36	541	10.82	43.96	56.04	42 - 58	
1.18	563	11.26	55.22	44.78	34 - 48	
0.600	538	10.76	65.98	34.02	26 - 38	
0.300	691	13.82	79.80	20.20	18 - 28	
0.150	204	4.08	83.88	16.12	12 - 20	
0.075	485	9.70	93.58	6.42	4 - 10	

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For CIVIL AIM CONSULTANTS & ENGINEERS

Assistant Executive Engineer
T. Dasarahalli Sub Division
Bagalagunte, BBMP
560073

Authorised Signatory

No. 01, Satvika Nilaya, Opp. Widia Poorna Prajna School,
Ramaiah Layout, Nagasandra, Bangalore - 560 073.
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DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Client	**Assistant Executive Engineer, T.Dasarahalli Sub Division, BBMP, Bangalore.**
Agency	**Sri. Shivalingaiah Satish , Contractor, Bangalore.**
Name of Work	Improvements to Drains and Providing Asphalting to Roads at Havanoor Layout and Surroundings in Ward No.14 Bagalagunte
Technical Reference	IS 2386(Part 1) 1963 (RA 2011)
Type of Mix	Bituminous Concrete
Date of Testing	16.05.2023

Sl no	Test	1	2	Requirements as per MORTH 5th edition table no 500.16
1	Flakiness Index	12.7	13.2	Combined Flakiness & Elongation index Max 35%
2	Elongation Index	12.8	13.4	
	Combined Flakiness & Elongation index	25.50	26.60	

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Authorised Signatory

Assistant Executive Engineer
T. Dasarahalli Sub Division
Bagalagunte, BBMP
Bangalore-560073

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TEST REPORT

Client	:	**Assistant Executive Engineer,** T.Dasarahalli Sub Division, BBMP, Bangalore.
Agency	:	**Sri. Shivalingaiah Satish , Contractor, Bangalore.**
Name of the work	:	Improvements to Drains and Providing Asphalting to Roads at Havanoor Layout and Surroundings in Ward No.14 Bagalagunte
IS Code	:	IS 73:2013, IS 1203:1978(RA 2008), IS 1205:1978(RA 2009), IS 1208:1978(RA 2009), IS 1209:1978(RA 2009)
Source of location	:	Hot mix Plant, Bangalore, VG 30
Date of testing	:	16.05.2023

The results of the tests conducted on the bitumen sample using for Bituminous Concrete

Sl. No	Description	Test Result	Requirement as per IS:73:2013
1	Penetration at 25 ^{0}C, 1/10 mm	58	Min 45
2	Softening point, ^{0}C	51	Min. 47
3	Ductility at 27^{0}C, cm	> 105	Min. 40
4	Flash Point, ^{0}C	270	Min. 220

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Job No.: CACE/BBMP/SLS/W.No.14/2023-24 Date : 18.05.2023

Specific Gravity And Water Absorption Test

Client	**Assistant Executive Engineer, T.Dasarahalli Sub Division, BBMP, Bangalore.**
Agency	**Sri. Shivalingaiah Satish , Contractor, Bangalore.**
Name of the Work	Improvements to Drains and Providing Asphalting to Roads at Havanoor Layout and Surroundings in Ward No.14 Bagalagunte
BIS Code	IS 2386(Part 3):1963
Type of Mix	Bituminous Concrete
Date of Testing	16.05.2023 to 18.05.2023

Sl. No.	Details	Notation	Test Number			Mean Value
			Test 1	Test 2	Test 3	
1	Weight of aggregate suspended in water with the basket	W_1 g	2026	2024	2028	
2	Weight of basket suspended in water	W_2 g	753	755	756	
3	Weight of saturated aggregate in water	$(W_1 - W_2) = W_s$ g	1273	1269	1272	
4	Weight of saturated surface dry aggregate in air	W_3 g	2018	2020	2022	
5	Weight of water equal to the volume of the aggregate	$(W_3 - W_S)$ g	745	751	750	
6	Weight of oven dried aggregate	W_4 g	2010	2011	2012	
7	Specific Gravity	$W_4/(W_3-W_S)$	2.698	2.678	2.683	2.686
8	Apparent Specific gravity	$W_4/(W_4-W_S)$	2.727	2.710	2.719	2.719
9	Water Absorption	$((W_3-W_4)*100)/W_4$	0.40%	0.45%	0.50%	0.45%

Comments:

→ Maximum allowable Aggregate Water absorption value for Bituminous Concrete is 2.0%(MORTH table 500.16)

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T.Dasarahalli Sub Division
BBMP

Authorised Signatory

No. 01, Satvika Nilaya, Opp. Widia Poorna Prajna School
Ramaiah Layout, Nagasandra, Bangalore - 560 073.
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Job No. CACE/BBMP/SLS/W.No.14/2023-24 Date: 23.05.2023

TEST REPORT ON STABILITY OF MIX

Client	:	**Assistant Executive Engineer,** T.Dasarahalli Sub Division, BBMP, Bangalore.
Agency	:	**Sri. Shivalingaiah Satish , Contractor, Bangalore.**
Name of the Work	:	Improvements to Drains and Providing Asphalting to Roads at Havanoor Layout and Surroundings in Ward No.14 Bagalagunte
Source of location	:	Hot mix Plant, Bangalore
Type of Mix	:	Bituminous Concrete
Date of Testing	:	23.05.2023

The results of the tests conducted on the Bituminous Concrete mix sample are as follows:

Sl. No	Description	Test Result 1	Test Result 2	Requirement as per MORTH (Table 500-19)
1	Marshal Stability, Kn	9.71	10.52	9 Kn (min)
2	Marshal flow, mm	2.73	3.27	2 – 4
3	Percent air voids in Mineral Aggregate	13.34	14.35	13 – 15
4	Voids in Compacted Mix	3.81	4.73	3 – 6
5	Percent Voids filled with Bitumen	70.13	71.28	65 - 75
6	Density, g/cc	2.22	2.25	--

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Authorised Signatory

Assistant Executive Engineer
T. Dasarahalli Sub Division
Bagalagunte, BBMP
Bangalore-560073

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Job No.: CACE/BBMP/SLS/W.No.14/2023-24 Date: 23.05.2023

TEST REPORT ON STABILITY OF MIX

Client	:	**Assistant Executive Engineer,** T.Dasarahalli Sub Division, BBMP, Bangalore.
Agency	:	**Sri. Shivalingaiah Satish , Contractor, Bangalore.**
Name of the Work	:	Improvements to Drains and Providing Asphalting to Roads at Havanoor Layout and Surroundings in Ward No.14 Bagalagunte
Source of location	:	Hot mix Plant, Bangalore
Type of Mix	:	Bituminous Concrete
Date of Testing	:	23.05.2023

The results of the tests conducted on the Bituminous Concrete mix sample are as follows:

Sl. No	Description	Test Result 1	Test Result 2	Requirement as per MORTH (Table 500-19)
1	Marshal Stability, Kn	9.84	9.21	9 Kn (min)
2	Marshal flow, mm	3.29	2.95	2 – 4
3	Percent air voids in Mineral Aggregate	13.72	14.15	13 – 15
4	Voids in Compacted Mix	3.91	4.36	3 – 6
5	Percent Voids filled with Bitumen	69.69	70.95	65 - 75
6	Density, g/cc	2.24	2.26	--

Note:

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For CIVIL AIM CONSULTANTS & ENGINEERS

Authorised Signatory

Assistant Executive Engineer
T. Dasarahalli Sub Division
Bagalagunte, BBMP

No. 01, Satvika Nilaya, Opp. Widia Poorna Prajna School,
Ramaiah Layout, Nagasandra, Bangalore - 560 073.
Ph: 9591618639, GSTIN: 29CNWPD9510K1ZB, Email: civilaimconsultants@gmail.com

CIVIL AIM CONSULTANTS & ENGINEERS

(Building Geo-Tech & Highway Materials Testing Laboratory)

An ISO 9001-2015 Certified Company

NABL Accredited As Per ISO/IEC 17025:2017 Laboratory

Job No.: CACE/BBMP/SLS/W.No.14/2023-24 Date : 23.05.2023

BITUMEN CONTENT AND GRADATION DETERMINATION OF BITUMINOUS CONCRETE

AASHTO T 164 & AASHTO T 30

CLIENT	**Assistant Executive Engineer, T.Dasarahalli Sub Division, BBMP, Bangalore.**
AGENCY	**Sri. Shivalingaiah Satish , Contractor, Bangalore.**
NAME OF THE WORK	Improvements to Drains and Providing Asphalting to Roads at Havanoor Layout and Surroundings in Ward No.14 Bagalagunte
SAMPLE ID	Hot Mix Plant, Bangalore
DATE OF TESTING	23.05.2023

BITUMEN CONTENT DETERMINATION

Description	Sample 1	Sample 2
1. Weight of Mixture before Test, g	500	500
2. Weight of Mixture after Test, g	472.5	471.5
3. Weight of Asphalt and Mineral matter Extracted, g	27.5	28.5
4. Weight of Mineral Matter, g.	-	-
5. Weight of Ash, g	-	-
6. Weight of Bitumen Extracted, g. (corrected)	27.5	28.5
7. Bitumen content in %	5.50	5.70
8. Average	5.60	

GRADATION AFTER EXTRACTION

SIEVE SIZE	Test 1				Requirement as per MORTH table 500.17
mm	Weight Retained, gm	Cummulative Weight Retained	%Cummulative Retained	% Passing	
19	0	0	0	100	100
13.2	14.7	14.7	3.1	96.9	90 - 100
9.5	65.8	80.5	17.0	83.0	70 - 88
4.75	90.3	170.8	36.1	63.9	53 - 71
2.36	46.2	217	45.9	54.1	42 - 58
1.18	35.8	252.8	53.5	46.5	34 - 48
0.600	55.3	308.1	65.2	34.8	26 - 38
0.300	42.8	350.9	74.3	25.7	18 - 28
0.150	34.9	385.8	81.7	18.3	12 - 20
0.075	42.8	428.6	90.7	9.3	4 - 10

SIEVE SIZE	Test 2				Requirement as per MORTH table 500.17
mm	Weight Retained, gm	Cummulative Weight Retained	%Cummulative Retained	% Passing	
19	0	0	0	100	100
13.2	15.3	15.3	3.2	96.8	90 - 100
9.5	66.2	81.5	17.3	82.7	70 - 88
4.75	92.8	174.3	37.0	63.0	53 - 71
2.36	45.3	219.6	46.6	53.4	42 - 58
1.18	48.2	267.8	56.8	43.2	34 - 48
0.600	56.3	324.1	68.7	31.3	26 - 38
0.300	45.8	369.9	78.5	21.5	18 - 28
0.150	37.9	407.8	86.5	13.5	12 - 20
0.075	32.6	440.4	93.4	6.6	4 - 10

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BITUMEN CONTENT AND GRADATION DETERMINATION OF BITUMINOUS CONCRETE

AASHTO T 164 & AASHTO T 30

CLIENT	**Assistant Executive Engineer, T.Dasarahalli Sub Division, BBMP, Bangalore.**
AGENCY	**Sri. Shivalingaiah Satish , Contractor, Bangalore.**
NAME OF THE WORK	Improvements to Drains and Providing Asphalting to Roads at Havanoor Layout and Surroundings in Ward No.14 Bagalagunte
SAMPLE ID	Hot Mix Plant, Bangalore
DATE OF TESTING	23.05.2023

BITUMEN CONTENT DETERMINATION

Description	Sample 1	Sample 2
1. Weight of Mixture before Test, g	500	500
2. Weight of Mixture after Test, g	472.5	472
3. Weight of Asphalt and Mineral matter Extracted, g	27.5	28
4. Weight of Mineral Matter, g.	-	-
5. Weight of Ash, g	-	-
6. Weight of Bitumen Extracted, g. (corrected)	27.5	28
7. Bitumen content in %	5.50	5.60
8. Average	5.55	

GRADATION AFTER EXTRACTION

SIEVE SIZE	Test 1				Requirement as per MORTH table 500.17
mm	Weight Retained, gm	Cummulative Weight Retained	%Cummulative Retained	% Passing	
19	0	0	0	100	100
13.2	13.8	13.8	2.9	97.1	90 - 100
9.5	68.9	82.7	17.5	82.5	70 - 88
4.75	92.6	175.3	37.1	62.9	53 - 71
2.36	42.5	217.8	46.1	53.9	42 - 58
1.18	36.8	254.6	53.9	46.1	34 - 48
0.600	50.9	305.5	64.7	35.3	26 - 38
0.300	46.3	351.8	74.5	25.5	18 - 28
0.150	35.8	387.6	82.0	18.0	12 - 20
0.075	46.9	434.5	92.0	8.0	4 - 10

SIEVE SIZE	Test 2				Requirement as per MORTH table 500.17
mm	Weight Retained, gm	Cummulative Weight Retained	%Cummulative Retained	% Passing	
19	0	0	0	100	100
13.2	16.1	16.1	3.4	96.6	90 - 100
9.5	62.8	78.9	16.7	83.3	70 - 88
4.75	90.9	169.8	36.0	64.0	53 - 71
2.36	46.5	216.3	45.8	54.2	42 - 58
1.18	43.8	260.1	55.1	44.9	34 - 48
0.600	52.4	312.5	66.2	33.8	26 - 38
0.300	49.3	361.8	76.7	23.3	18 - 28
0.150	35.6	397.4	84.2	15.8	12 - 20
0.075	40.8	438.2	92.8	7.2	4 - 10

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